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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/566,187	04/10/2006	Yuichiro Sugiyama		2561

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EXAMINER	
HU, HENRY S	

ART UNIT	PAPER NUMBER
1796	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/566,187	SUGIYAMA, YUICHIRO	
	Examiner	Art Unit	
	HENRY S. HU	1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *Election of July 2, 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9* is/are pending in the application.

4a) Of the above claim(s) *1 and 4-9* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2 and 3* is/are rejected.

7)☒ Claim(s) *2 and 3* is/are objected to.

8)☒ Claim(s) *1-9* are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10 April 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☒ Other: *Library search 304773 and 304773-B*.

DETAILED ACTION

1. This office action is in response to **Election** filed on July 2, 2009, which is in response to Restriction requirement filed on June 10, 2009. **Applicant's Election of Group II, Claims 2 and 3 is traversed with remarks on pages 1-2.** The traversal is on the ground(s) that it would not place an undue burden to search and examine non-elected Group I (Claim 1), Group III (Claim 4), Group IV (Claims 5 and 7-8) and Group V (Claims 6 and 9) with the elected Group II since they are so closely related in the field of fluorinated monomer, polymer and its applications. This is not found persuasive because Groups I-V is each drawn to a technology, requiring search in different classification area. In instant case, Group I is related to **a monomer**, Group II is related to **a graft copolymer**, Group III is related to **a process of making a graft copolymer**, while Group IV and Group V is each related to **a different polymer electrolyte membrane**.

To be more specific, Group I is a monomer which is in very small molecular weight and is active in polymerizability, Group II and Group III is a graft copolymer and its process of making in very high molecular weight and is not active at all in polymerizability, while Group IV and Group V is at least somewhat different polymer electrolyte membrane.

Even each group comprises the same monomer unit having a formula (1), its structure, function, property and application in each group is still different. The key point is that the individual property of monomer as disclosed in Group I will not be shown up fully in the polymer of other groups. They are thereby not equivalent and interchangeable.

2. The requirement for this PCT is still deemed proper and is therefore made FINAL. Applicants' **Pre-Amendment** and **one IDS** (one page) have been filed so far**.** This Application **10/566,187** is a **371/PCT/JP04/017988** with a Japanese priority at November 28, 2003**.** With such a pre-amendment, **Claims 5 and 7 are amended; new Claims 8 and 9 are added, while no claim is cancelled**. The improper multiple claim dependency is corrected accordingly. Examiner **accepts Applicants' one drawing sheet with Figure 1** (a brief description is shown on page 7). **Claims 1-9 with four independent claims (Claims 1, 2, 4 and 6) are now pending,** while non-elected **Claims 1 and 4-9** (Groups I and III-V) are all withdrawn from consideration. An action follows. See **no** "X" or "Y"-cited reference in international search report in Applicants' priority document **PCT/JP2004/017988**.

Claim Objections

3. **Claims 2 and 3 are objected to** because of the following informalities:

(a) On **Claim 2** at line 1 and **Claim 3** at line 1, the language as "a graft copolymer **compound**" and "the monomer **compound**" is very improper. **According to the art, a compound is treated quite differently from monomer and polymer**. Correction to "a graft

copolymer" and "the monomer" according to the art is needed. Otherwise, one having ordinary skill in the art may be confused.

(b) On **Claim 3**, **the chemical structure as shown in formula (2) is wrong** for grafting the "styrene" type monomer having the formula (1) onto base polymer, which is a copolymer of ethylene and tetrafluoroethylene. **The entire styrene unit needs to be inside the bracket as repeating unit (m)**. One carbon is missing in the styrene structure. Attorney may call Examiner for detail in this regard.

Claim Rejections - 35 USC § 103

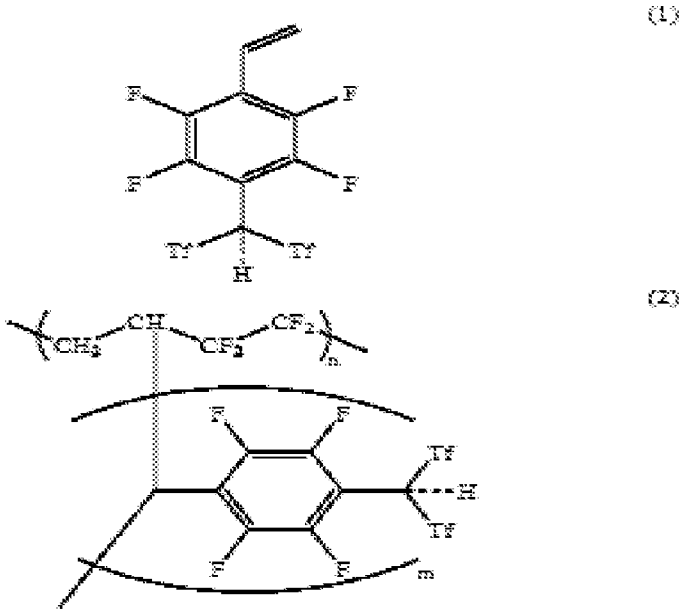
4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. The limitation of parent **Claim 2** in present invention relates to ***a graft copolymer*** *having a general* ***formula (2)***. *Said polymer has a grafting monomer having a* ***formula (1)*** ***with two Tf or trifluoromethane sulfonyl groups (-SO_2-CF_3)***.



See other limitations of dependent ***Claim 3***.

6. **Claims 2 and 3 are rejected** under 35 U.S.C. 103(a) as being unpatentable over **MacKinnon** et al. (US 6,828,386 B2) and/or **Stone** et al. (US 6,359,019 B1) in view of a combination of **three** references including **Ishihara** et al. (Angew. Chem., vol. 113, pp. 4201-4203, (2001)), **Middleton** et al. (US 3,179,640) and **Sprague** et al. (Journal of Fluorine Chemistry, vol. 52, pp. 301-306, (1991)).

Regarding the "**grafting copolymer**" of parent **Claim 2**, the graft copolymer is achieved by directly applying a "styrene" type monomer having formula **(1)** for radiation-induced graft polymerization onto the backbone of some base polymer(s). According to its dependent **Claim 3**, said base polymer includes copolymer made of the claimed two monomers including ethylene (E) and tetrafluoroethylene (TFE) as disclosed in dependent **Claim 3** in this regard. In summary, said "styrene" type grafting monomer has a combination of **three** conditions including: (A) a styrene to be useful as polymerizable moiety, (B) four fluorine on benzene ring, and (C) a specified methyl group having two **Tf (trifluoromethane sulfonyl) groups** on it.

7. **Two** references including **MacKinnon and Stone** in combination or alone has already disclosed the some graft polymerization process by **irradiating at a base polymer with ionizing radiation**. The base polymer can be a copolymer or a dipolymer made of the claimed **two** monomers including **ethylene (E) and tetrafluoroethylene (TFE)** as exactly disclosed in dependent **Claim 3**. For instance, see MacKinnon at column 2, line 64-65; see Stone at column 6, line 10-11. It can then perform addition type graft-polymerization by using fluorostyrenic monomer, and finally apply sulfonation reaction on the styrenic ring so as to introduce the desired sulfonyl functional group" for making a fluorinated ion exchange polymer membrane. In a very close examination, fluorostyrenic monomers used by references include trifluorovinyl, difluorovinyl or monofluorovinyl, but not vinyl one.

8. To be specific, see **MacKinnon** at abstract; column 2, line 61 - column 3, line 14; see **Stone** (019) at abstract; column 2, line 25-61. See working examples in both references.

9. Therefore, **MacKinnon and Stone** (019) in combination or alone is "at least" silent about **two** things as (A) "**using the claimed fluorostyrenic monomer (1) directly for the direct graft polymerization**", and (B) why use **non-fluorinated vinyl** moiety. A combination of **three** references including **Ishihara, Middleton and Sprague** has taught such a subject matter. **Ishihara** has disclosed the preparation of two Bronsted acids including **pentafluorophenyl-bis(triflyl)-methane (formula (2))** and its derived **polystyrene-bound tetrafluorophenyl-bis(triflyl)-methane (formula (3))**. Particularly see page **4201** at left middle section.

10. With respect to the motivation of making of styrene type monomer, **Middleton** has explicitly disclosed the preparation of vinyl-containing styrenic monomers **when some fluorinated groups are attached to the phenyl ring** (see column 1, line 15-30). By doing so, such resulted monomer can be readily for use in traditional radical-induced polymerization (see column 2, line 52-64).

11. With respect to the critical point why use non-fluorinated vinyl moiety instead of using the above-mentioned MacKinnon, Stone or Middleton's fluorinated vinyl moiety, **Sprague** in experimental comparison has taught that the preparation of Middleton's **trifluorovinyl analogue** in the case that electron-withdrawing is attached on phenyl ring (see formula 2 on page 303) has proved to result the undesired dimerization rather than additional polymerization by using non-fluorinated vinyl moiety (see page 302 at the end).

12. In light of the fact that all the involved references are dealing with the preparation of monomer and polymer from styrene type moiety, one having ordinary skill in the art would therefore have found it obvious to apply **MacKinnon and/or Stone**'s graft polymerization process to the claimed formula (1), which such a monomer's vinyl-containing structure can be derived from the teaching of a combination of **three** references including Ishihara, Middleton and Sprague. By doing so, only the addition type polymerization grafting on the polymer's backbone of a copolymer or a dipolymer made of the claimed two monomers including ethylene (E) and tetrafluoroethylene (TFE) as disclosed in dependent **Claim 3** will be effectively obtained.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicants' disclosure. The following references relate to a graft copolymer having a general formula (2). Said polymer has a grafting monomer having a formula (1) with two Tf or trifluoromethane sulfonyl groups ($-SO_2-CF_3$):

US 6,607,856 B2 to Suzuki et al. only discloses the preparation of some IPN structure containing some functional groups of sulfonic acid or phosphoric acid. See abstract; Figure 9. The claimed "styrene" type monomer having formula **(1)** for radiation-induced graft polymerization onto some base polymer(s) is not disclosed or suggested at all.

14. Any inquiry concerning this communication or earlier communication from the examiner should be directed to **Dr. Henry S. Hu whose telephone number is (571) 272-1103**. The examiner can be reached on Monday through Friday from 9:00 AM –5:00 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dr. Vasu Jagannathan, can be reached on (571) 272-1119. The **fax** number for the organization where this application or proceeding is assigned is **(571) 273-8300** for all regular communications. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Peter D. Mulcahy/
Primary Examiner, Art Unit 1796

/Henry S. Hu/
Examiner, Art Unit 1796

September 26, 2009